

Olgu Sunumu

A Rare Complication of Internal Jugular Vein Cannulation: Pseudoaneurysm of the Thyrocervical Trunk

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SUMMARY

Central venous cannulations, especially through internal jugular and subclavian veins, are commonly used for different reasons and associated with a high rate of successful placement. However, more than 15% of the patients may have complications. Although it is rare, thyrocervical trunk pseudoaneurysm may be one of the complications that follows multiple catheterization attempts. In this report, we present a case of thyrocervical trunk pseudoaneurysm developed after a difficult internal jugular vein cannulation using a landmark-guided technique. Our aim is to emphasize this rare complication, the importance of using ultrasound-guided central venous cannulations, identifying pseudoaneurysm(s) and also the treatment with endovascular coil embolization.

Key words: thyrocervical trunk pseudoaneurysm, internal jugular vein cannulation, subclavian vein cannulation

ÖZET

İnternal Juguler Ven Kateterizasyonunda Ender Bir Komplikasyon: Tiroservikal Trunkus Psödoanevrizması

Santral ven kateterizasyonları, özellikle de internal juguler ve subklaviyen venler aracılığıyla uygulananlar, farklı nedenlerle yaygın olarak kullanılmaktadır ve yerleşimleri yüksek başarı oranlarıyla ilişkilidir. Ancak, hastaların %15'inden fazlası komplikasyon ile karşılaşabilmektedir. Tiroservikal trunkus psödoanevrizması da ender olmasına rağmen, çok sayıda kateterizasyon denemesini takiben gelişebilecek komplikasyonlardan biridir. Bu olgu ile, anatomik işaretleme yöntemi kullanılarak uygulanan zor internal juguler ven kateterizasyonu sonrası gelişen tiroservikal trunkus psödoanevrizma deneyimimizi paylaşıyoruz. Amacımız, bu ender komplikasyonu, santral ven kateterizasyonu sırasında ultrason kullanımını, psödoanevrizma tanı yöntemlerini ve aynı zamanda bunun endovasküler koil embolizasyonu ile tedavisini vurgulamaktır.

Anahtar kelimeler: tiroservikal trunkus psödoanevrizması, internal juguler ven kateterizasyonu, subklaviyen ven kateterizasyonu

INTRODUCTION

Central venous cannulations are commonly used for different reasons such as hemodynamic monitoring, administration of drugs and blood products, hemodialysis, temporary cardiac pacemaker implantation, and in cases with no way of opening a peripheral venous access. However, more than 15% of patients may

have complications such as arterial puncture, severe bleeding, hematoma, thrombosis, hemothorax, pneumothorax, airway obstruction, air embolism, atrial or ventricular arrhythmias, malpositioning of the catheter, intra-arterial placement of the catheter and secondary infections [1-5]. Thyrocervical trunk pseudoaneurysm, following internal jugular vein (IJV) cannulation attempts, is a rare complication and a few cases have been reported so far [1,2,6-9]. Here, we discuss a case of thyrocervical trunk pseudoaneurysm developing after a difficult IJV cannulation using a blind landmark-guided technique. Our aim is to raise the awareness of such a rare complication, importance of using ultrasound-guided central venous cannulations, identification of existing pseudoaneurysm and also its treatment with endovascular coil embolization.

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CASE REPORT

A 58-year-old female patient (weight: 70 kg, height: 155 cm) with hypertension, moderate left ventricular hypertrophy, moderate tricuspid valve regurgitation, heart failure, and unregulated diabetes mellitus was referred to the Hand Surgery Division of Plastic Surgery Department for her severe pain and swelling of the right hand thumb.

Her accurate diagnosis of a septic flexor tenosynovitis and total distal phalangeal osteonecrosis depended on the physical examination, blood test results, and imaging scans such as X-ray and computed tomography (CT). Soon after, she was brought to the operating theatre for debridement, irrigation and disarticulation of the distal phalanx. Following standard non-invasive monitoring techniques, right axillary brachial plexus block and surgery were both performed uneventfully.

At the end of the surgery, we decided to place a central venous catheter, because the patient was on IV antibiotic therapy and a peripheral venous access was extremely difficult. Initially, a left subclavian vein (SCV) cannulation was attempted either to avoid the use of right side again (same side with the axillary brachial plexus block) or to secure the catheter easily without any problematic neck mobilization. A conventional anatomical landmark-guided technique was used and several attempts were unsuccessful. The procedure was decided to be carried on with the IJV cannulation, still on the left side. Accidental arterial puncture was noted at the first attempt and bleeding was immediately controlled by local compression. Then, access to the vein was successful, however the guide wire could be inserted on the third attempt. Finally, a double-lumen 7F, 20 cm catheter (Royal For- nia Medical Equipment Co., Ltd. Guangdong, China) was inserted for 13 cm. We could aspirate venous blood from all ports.

In the postoperative care unit (PACU), 500 mL of IV 0.9% NaCl was infused through the catheter without any swelling or pain in the neck. Postoperatively, a chest X-ray was taken to confirm the correct placement of the catheter and exclude any possibility of pneumothorax.

On the day of surgery, the catheter was used only

for IV antibiotics and additional 300 mL of IV 0.9% NaCl infusion. In the next morning, the patient complained about shortness of breath, painful swelling and ecchymosis over the left supraclavicular region and base of the neck. She also had tingling, numbness and swelling in the left arm. A physical examination revealed a tender, 3x4 cm diameter supraclavicular mass, without bruit, but presence of oedema all over the left arm and hand. A possible hematoma or an extravascular placement of the catheter might have been the reasons for the left upper extremity oedema due to the obstruction of the venous drainage of the arm. IJV catheter was presumably held responsible for these complications, so after its immediate removal, the patient was consulted to Radiology Department for Color-Doppler ultrasound.

Color-Doppler ultrasound showed a subcutaneous 43x33x92 mm hematoma above the left clavicle and a pseudoaneurysm. The precise site of origin of the pseudoaneurysm measuring 26x18 mm was determined as thyrocervical trunk by CT angiography. Then, the patient was scheduled for an angiographic examination for a more complete determination of the location and size of the pseudoaneurysm, and also for a possible treatment by endovascular coil embolisation. A 5-Fr introducer was inserted through the right femoral artery. It was advanced further to visualize left internal and external carotid, vertebral, subclavian arteries, and thyrocervical, costocervical branches. The pseudoaneurysm of the left thyrocervical trunk was visualised (Figure 1A). A transcend microguide and a catheter were inserted into the thyrocervical trunk and a catheter compliant balloon with dimensions of 4.00/10 mm (Scepter C, MicroVention Terumo, CA, USA) was placed distally. Then, target helical ultra 2 mm x 2 cm, 2 mm x 1 cm, 3 mm x 8 cm and 4 mm x 8 cm coils (Stryker Neurovascular, Target, Cork, Ireland) and an additional microplex 2 mm x 2 cm coil (Codman, Raynham, MA, USA) were all placed for the embolization of the feeding artery of the pseudoaneurysm. The pseudoaneurysm was completely occluded and angiogram did not demonstrate any extravasation of the dye from the thyrocervical trunk (Figure 1B). Post-procedural period was uneventful, and after the regression of her symptoms within 3 days she was discharged home. There has been no sign of recurrence within postoperative 2 months by now.



Figure 1. Angiogram of the left thyrocervical trunk pseudoaneurysm A:Before endovascular coil embolization treatment. B:After endovascular coil embolization treatment.

DISCUSSION

The IJVs and SCVs are easily accessible and widely used for central venous catheter placement with great success. However, their use is not without risks and patients may have several complications [3-5]. The most common complication was reported as arterial puncture with an incidence of 3% [10].

Approximately 5% of the patients have anatomic variations of the IJV and SCV, making it difficult to locate the vein using a blind approach. Because of the variations and close anatomical relationships, smaller arteries can also be accidentally punctured during the IJV cannulation attempts [2,8].

Pseudoaneurysms are vascular lesions that can be seen after accidental arterial punctures [8]. In 1975, Shield et al. [7] reported the first case of thyrocervical trunk pseudoaneurysm developed after IJV cannulation which was attributed to using a lateral approach to the IJV. At this point, inadvertent lateral injury of the subclavian artery or thyrocervical trunk itself may be the cause of the pseudoaneurysm.

In our patient, several factors might lead to the thyrocervical trunk pseudoaneurysm such as multiple traumatic needle and guide wire insertions, age, ath-

erosclerosis and hypertension. On the other hand; although the right IJV approach has become standard practice, our preference of left side SCV and then IJV cannulations with several unsuccessful attempts might have been additional risk factors. Moreover, our use of blind landmark-guided technique might have increased the risk of arterial puncture and related occurrence of pseudoaneurysm in our case. Therefore; the use of real-time ultrasound-guided central venous cannulations is recommended to increase the success and the decrease the complication rates [11-14].

A pseudoaneurysm may cause symptoms as bruit, pain, airway obstruction with pressure effects on local structures or may present with rupture, persistent hemorrhage, hematomas, embolisms or thrombosis [2,8,9]. The appearance of a pulsating mass with or without a bruit around the neck, shortly or even one to four weeks after the central venous cannulation of the IJV or SCV should raise the suspicion of a pseudoaneurysm [1,15]. In our patient, it occurred immediately in to next morning after the IJV cannulation.

The incidence of pseudoaneurysms due to the injuries is not known. This may be a rare complication or the complications might be undiagnosed and unreported. Sometimes, differentiation of pseudoaneurysms from simple hematomas by clinical examination alone may

be difficult. As well as hematomas, pseudoaneurysms may also resolve spontaneously [16-19]. Misinterpretation of a neck swelling as a hematoma instead of a pseudoaneurysm can lead to underreporting, especially if it is not evaluated by ultrasound to confirm the diagnosis. Moreover, CT angiography and angiography can be more useful for both the diagnosis and determination of the origin and size of the pseudoaneurysm.

Treatment of pseudoaneurysm is controversial. Findings as size, anatomical location of pseudoaneurysm, expansion of aneurysm, and presence of coagulopathy, and patient compliance for follow-up should all be considered in decision-making process [2,8]. Treatment options for hematoma and pseudoaneurysm include ultrasound-guided evacuation of the hematoma, ultrasound-guided compression, intravascular thrombin injection, endovascular coil embolization, other endovascular techniques as coated stent implantation, balloon occlusion and open surgical repair [2,8]. Endovascular coil embolization has been widely used in the treatment of a pseudoaneurysm at various sites. It is an easy, safe and useful alternative technique which was performed successfully in our patient.

Kobeiter et al. [20] reported 88% success rate of coil embolization of femoral pseudoaneurysms after the use of two to nine coils with 11.7% recurrence rate within 9.5 months. The pseudoaneurysm of our case was occluded using 5 coils and there has been no sign of recurrence within postoperative 2 months by now. Most reported cases with pseudoaneurysms measuring ≤ 4 cm in diameter were managed with non-surgical approaches, either using coil embolization or thrombin injections [1].

In conclusion, thyrocervical trunk pseudoaneurysm is a rare complication, and may be misinterpreted if appropriate diagnostic imaging methods as ultrasound, CT angiography and angiogram are not applied. Angiogram is also a safe and effective technique for the treatment using endovascular coil embolization, at least for managing pseudoaneurysms up to 4 cm in diameter. This case serves to emphasize this complication, importance of its prevention by use of real-time ultrasound, its diagnosis and also treatment with efficient use of endovascular coil embolization.

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